

WE CLAIM:

1. A device comprising:
a main magnetic pole; and
a C-aperture structure disposed adjacent the main magnetic pole, wherein light incident upon the C-aperture structure and a magnetic flux flowing through the main magnetic pole are co-locatable on a recording medium disposed adjacent the device.
2. The device of claim 1, wherein the C-aperture structure comprises:
a layer of dielectric material disposed adjacent the main magnetic pole, the layer of dielectric material having a first index of refraction; and
a layer of conductive material disposed adjacent the layer of dielectric material.
3. The device of claim 2, wherein the layer of dielectric material is selected from the group consisting of titanium oxide, tantalum oxide, aluminum oxide, silicon oxide, silicon nitride and zinc sulfide.
4. The device of claim 2, wherein the layer of conductive material is selected from the group consisting of gold, silver, copper and aluminum.
5. The device of claim 2, wherein the main magnetic pole includes front, back, leading edge and trailing edge surfaces, and wherein the layers of dielectric material and conductive material are provided at the front, back and trailing edge surfaces of the main magnetic pole.

6. The device of claim 1, wherein the main magnetic pole includes front, back, leading edge and trailing edge surfaces, and wherein the C-aperture structure is provided about the front, back and trailing edge surfaces of the main magnetic pole.

7. The device of claim 1, wherein the main magnetic pole includes a pole tip at an air bearing surface of the device, and wherein the C-aperture structure is provided at the pole tip of the main magnetic pole.

8. The device of claim 1, wherein the C-aperture structure includes a transducer device deposited at an air bearing surface of the device, the transducer device confining the light propagating through the C-aperture structure.

9. The device of claim 1, further comprising a focusing element receiving light from a light source and focusing the received light onto the C-aperture structure.

10. The device of claim 9, wherein the focusing element comprises a planar waveguide.

11. The device of claim 10, wherein the planar waveguide comprises:
a layer of core material having a second index of refraction, the core layer planarized to a height of the C-aperture structure; and

cladding layers disposed on opposite sides of the core layer, wherein the cladding layers have a third index of refraction less than the second index of refraction.

12. The device of claim 11, wherein the core layer includes a convexly curved top surface focusing the received light onto the C-aperture structure.

13. The device of claim 12, wherein the planar waveguide further comprises a lower index core material provided about the core layer at the top, front and back surfaces thereof, the lower index core material including a fourth index of refraction less than the second index of refraction and greater than the third index of refraction.

14. A magnetic recording device for magnetic recording on a recording medium comprising:

a magnetic pole; and

a C-aperture structure provided about the magnetic pole, wherein light incident upon the C-aperture structure and a magnetic flux flowing through the magnetic pole are co-located on a recording medium disposed adjacent the magnetic recording device.

15. The magnetic recording device of claim 14, wherein the magnetic pole includes front, back, leading edge and trailing edge surfaces, and wherein the C-aperture structure is provided about the magnetic pole at the front, back and trailing edge surfaces thereof.

16. The magnetic recording device of claim 15, wherein the C-aperture structure includes opposing arm members connected at an end by a waist member, and wherein the C-aperture structure is provided about the magnetic pole such that the opposing arm members are positioned adjacent the front and back edges of the magnetic pole and the waist member is positioned adjacent the trailing edge of the magnetic pole.

17. The magnetic recording device of claim 14, wherein the C-aperture structure comprises:

a layer of dielectric material provided on the magnetic pole, the layer of dielectric material having a first index of refraction; and

a layer of conductive material provided on the layer of dielectric material.

18. The magnetic recording device of claim 17, wherein the layer of dielectric material is selected from the group consisting of titanium oxide, tantalum oxide, aluminum oxide, silicon oxide, silicon nitride and zinc sulfide.

19. The magnetic recording device of claim 17, wherein the layer of conductive material is selected from the group consisting of gold, silver, copper and aluminum.

20. The magnetic recording device of claim 17, wherein the magnetic pole includes front, back, leading edge and trailing edge surfaces, and wherein the layers of dielectric material and conductive material are provided at the front, back and trailing edge surfaces of the magnetic pole.

21. The magnetic recording device of claim 14, wherein the magnetic pole includes a pole tip at an air bearing surface of the magnetic recording device, and wherein the C-aperture structure is provided about the magnetic pole at the pole tip.

22. The magnetic recording device of claim 14, wherein the C-aperture structure includes a transducer device disposed at an air bearing surface of the magnetic recording device, the transducer device confining the light propagating through the C-aperture structure.

23. The magnetic recording device of claim 14, further comprising a focusing element receiving light from a light source and focusing the received light onto the C-aperture structure.

24. The magnetic recording device of claim 23, wherein the focusing element comprises a planar waveguide.

25. The magnetic recording device of claim 24, wherein the planar waveguide comprises:

a layer of core material having a second index of refraction, the core layer planarized to a height of the C-aperture structure; and

cladding layers disposed on opposite sides of the core layer, wherein the cladding layers have a third index of refraction less than the second index of refraction.

26. The magnetic recording device of claim 25, wherein the core layer includes a convexly curved top surface focusing the received light onto the C-aperture structure.

27. The magnetic recording device of claim 26, wherein the planar waveguide further comprises a lower index core material provided about top core layer at the top front and back surfaces thereof, the lower index core material including a fourth index of refraction less than the second index of refraction and greater than the third index of refraction.